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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,247	07/16/2003	Kazimierz J. Wikiel	004522-00019	9422

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EXAMINER	
WILKINS III, HARRY D	
ART UNIT	PAPER NUMBER
1742	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,247	WIKIEL ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) *4-15,18,25,26,31 and 45-47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,16,17,19-21,24,27-30,32-44 and 48-55* is/are rejected.

7)☒ Claim(s) *22 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status

1. The rejection of claims under 35 USC 103(a) based on Richards et al and Graham et al has been maintained. A new reference has been cited to aid in the resolution of the ordinary skill level in the art to assist in the determination of whether the claimed invention is obvious or not.

2. Applicant's remarks with respect to claims 22 and 23 are found persuasive, in that none of the prior art references teach or suggest using two independent electroanalytical responses in combination in step (c) of claim 1.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1-3, 16, 17, 19-21, 24 and 53 rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al ("Optimisation of a neural network model for calibration of voltammetric data") in view of Graham et al (US 6,365,033) with evidence of the level of ordinary skill from Richards et al "Multivariate Data Analysis in Electroanalytical Chemistry".

Richards et al teach (see abstract and "2. Experimental") a method including the steps of obtaining a sample set, wherein each sample includes an electrolyte solution of a known composition, obtaining an electroanalytical (dual pulse staircase voltammetry)

response for each of the samples to produce an electroanalytical response data set, obtaining a training set that included the sample set and corresponding response data set, analyzing the training set using decomposition (PCA) and multivariate regression (PCR, PLS) and validating the training data set to produce a predictive data set for a calibration model.

The method of Richards et al relates to calibration of voltammetric data of a mixture of ethanol, fructose and glucose, not to an electroplating bath.

However, it has been well documented that voltammetric response had been used to determine composition of copper electroplating baths. Graham et al describe (see abstract, figures 2 and 9 and cols. 5-6) creating a calibration data set to process results from a voltammographic measurement of complex copper electroplating solutions.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the method of Richards et al to calibrate voltammetric data of other solutions, such as the conventional copper electroplating bath voltammetric response. As evidenced by Graham et al, one of ordinary skill in the art would have had a reasonable expectation of successfully applying the neural network of Richards et al to a complex electroplating bath containing various constituents at significantly different compositions and which electrochemically interact with each other. The level of ordinary skill in the art, as shown in the "Multivariate" article, included the ability to determine parameters of a neural network for providing calibration of any voltammographic measurements, and not just the dual pulse staircase voltammetry technique of Richards et al ("Optimisation")

Regarding claim 16 and 17, Richards et al uses (see figure 2) a DOE routine with a multicomponent-multilevel linear orthogonal array.

Regarding claims 19 and 20, Richards et al teach (see page 36) using DPSV (dual pulse staircase voltammetry).

Regarding claim 21, Richards et al teach (see figure 2) using multiple data points.

Regarding claim 53, although not expressly taught by Richards et al, one of ordinary skill in the art would have found it obvious to have applied the predictive data set by (b1) obtaining an unknown sample set, (b2) obtaining the electroanalytical response of the unknown samples, (b3) preprocessing the data set to be entered into the predictive data set and (b4) applying the predictive calibration model to determine the concentration in the unknown sample.

5. Claims 27-44, 48, 49, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al in view of Graham et al (US 6,365,033) as applied above to claim 1 and further in view of Applicant's admission of prior art.

The teachings of Richards et al are described above.

Richards et al teach steps (a), (b), (c), (d), (e), (g), (i) and (j).

Thus, Richards et al fail to teach the two steps of detecting and eliminating outliers with the response data and training sets.

However, Applicant admits as prior art (see paragraph 47 of PG-Pub 2005/0183958) that detection and elimination of outliers in statistical data sets was a known technique in the prior art to control errors in the calibration.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a step of detection and elimination of outliers in the statistical data sets of Richards et al for the purpose of controlling errors in the calibration.

Regarding claims 38 and 39, Applicant admits as prior art (see paragraphs 88-89 of PG-Pub 2005/0183958) that an autoscaling process known as unit variance was known for a desired purpose. Therefore, it would have been obvious to one of ordinary skill in the art to have used the conventional autoscaling process for the known purpose of enhancing data point variation.

Regarding claims 40 and 48, Applicant admits (see paragraphs 101-104 and 183 of PG-Pub 2005/0183958) that SIMCA and F^C-ratio analysis were known methods of outlier detection. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the conventional outlier detection schemes in order to enhance data accuracy.

Regarding claims 42-44, Applicant admits as prior art (see paragraph 172 of PG-Pub 2005/0183958) that PRESS (prediction residual error sum of squares) was a known method of determining the optimal number of factors for calibration. Applicant further admits that PCR and PLS were the typical regression methods to determine the self-predicted concentrations.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the conventional PRESS method in order to determine the optimal number of factors for calibration. It further would have been obvious to one of ordinary skill in the

art to have used the conventional PCR or PLS regression methods to determine the self-predicted concentrations because of their known advantages in the art.

Regarding claims 54 and 55, Richards et al do not teach step (b), namely obtaining a secondary sample set, obtaining the electroanalytical response for the secondary sample set and using a direct standardization technique to obtain a secondary-to-primary response data set. However, Applicant admits (see paragraphs 42 and 209 of PG/Pub 2005/0183958) that direct standardization techniques were known in the art for allowing a primary calibration model to be transferred. Therefore, it would have been obvious to one of ordinary skill in the art to have applied a secondary sample set with the electroanalytical results of the secondary sample set to create a secondary-to-primary transformation data set by a direct standardization technique in order to perform the prediction at a later time.

6. Claims 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al in view of Graham et al (US 6,365,033) and Applicant's admission of prior art as applied to claim 27 and further in view of Schneider.

The teachings of Richards et al and Applicant's admission are described above.

However, Richards et al and Applicant's admission do not teach internal validation by cross validation.

Schneider teaches several methods of cross validation as model evaluation methods. The cross validation method was an internal process.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the cross validation models taught by Schneider to ensure that the model

developed by the neural network of Richards et al was producing an adequate prediction set.

Regarding claim 51, this claim corresponds to the "Leave-one-out cross validation" method of Schneider.

Regarding claim 52, this claim corresponds to the "holdout" method of Schneider.

Allowable Subject Matter

7. Claims 22 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not teach or suggest the "gluing" approach described by Applicant, and used in the process of claims 22 and 23, because the prior art teaches using a single voltammographic method for monitoring the composition. It is noted that claim 23 does require multiple electroanalytical responses as evidenced by the "s" at the end of "responses".

Response to Arguments

9. Applicant's arguments filed 9 February 2007 have been fully considered but they are not persuasive. Applicant has argued that:

a. Graham provides no details as to how to obtain calibration curves and provides no signal or data processing details for obtaining a calibration curve for a single component, much less calibration for the multiple components present in

its electroplating bath, and, as evidenced by Richards, generation of the calibration data set involves complex signal and data processing.

In response, the combination of Richards et al and Graham et al, keeping in mind the level of ordinary skill in the art, show that it was known to create calibration data sets for determining electroplating bath compositions (Graham et al), and that the advanced methods involved in creating those calibration data sets was known (Richards et al). The Examiner finds no inventiveness in using a known, although complex, calibration technique (Richards et al) for a process where it was known that calibration was necessary (Graham et al).

b. Graham et al teaches stripping voltammetry of baths containing metal ions and Richards et al teach dual pulse staircase voltammetry on aliphatic analyte solutions containing no metal ions.

In response, the invention of Richards et al reasonably teaches one of ordinary skill in the art that the training system can be used for formation of calibration data for methods of determining compositions of complex solutions. One of ordinary skill in the art would not have viewed the training neural network as only being suitable for the disclosed composition and voltammetry technique, but for other voltammetric processes and compositions. Further, as evidenced by "Multivariate Data Analysis in Electroanalytical Chemistry" (by Richards et al), use of the neural networks for different voltammetric techniques was contemplated in the prior art, not just the dual pulse staircase voltammetry for the aliphatic analytes.

c. The combination of Richards et al and Graham et al at most states that it would be "obvious-to-try" the combination, and thus, does not make the claimed invention obvious.

In response, it is clear from reading Richards et al, that the level of ordinary skill in the art was of sufficient level to determine the proper operating parameters of the neural network, in response to a voltammogram measurement. Thus, any gaps in the specific teachings of Richards et al and Graham et al are within the level of ordinary skill, especially when considering the teachings of the "Multivariate" article by Richards et al.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry D. Wilkins, III
Primary Examiner
Art Unit 1742

hdw